

Chapter 10

Resource Management Strategies

This chapter addresses the Resource Management Strategies (RMS) listed in the California Water Plan Update 2009 (CWP 2009), with the addition of two region-specific strategies identified by the CABY stakeholders and identified by the Planning Committee (PC). The intention of the RMS is to encourage diverse approaches to solve water management issues as a means to “mitigate for uncertain future circumstances” and comply with Public Resource Code (PRC) Section 75026 and California Water Code Section 10541(e)(2) (DWR 2010).

The chapter describes which RMS are considered applicable to the region, how the RMS were used in updating the IRWMP document (e.g., applicability to issues identified in the Region Description, development of measurable objectives, assessment of adaptive management strategies for climate change, project review and integration, and Plan implementation), how future data management activities will inform RMS updates, and how climate change considerations affected and were integrated into the RMS framework.

The RMS structure will be used by the governing body into the future to support Plan updates in response to ongoing and new studies, development of new data and as new issues emerge. Future Plan updates will consider whether strategies identified as ‘not applicable’ in the 2013 IRWMP Update may become applicable in response to changing conditions in the watershed.

10.1 Applicable CABY Resource Management Strategies (RMS)

The Proposition 84 Guidelines (DWR, August 2012) describe 29 RMS, based on the California Water Plan Update 2009. As described in section 10.2 below, the RMS Work Group and the PC identified 23 RMS deemed relevant to the IRWMP process and two additional region-specific strategies felt to be essential for full implementation of this IRWMP.

To achieve the CABY Plan goals and objectives articulated in Chapter 9, a wide range of RMS were considered by the stakeholders, Work Groups, and PC. Table 10-1 identifies the RMS that were identified by the PC as applicable to the region. A rationale for each RMS determined as “not relevant to the region” is included in the table. The mix of RMS displayed in Table 10-1 demonstrates the breadth of potential water management tools available to CABY stakeholders. As described in the following sections, the future effects of climate change relative to applicable RMS were taken into consideration during RMS selection.



Table 10-1 RMS Determination of Regional Relevance with Rational for Determination		
State RMS (DWR 2012 Guidelines) (Applicable RMS are numbered)	Resource Management Strategies Addressed in Plan	Rationale for Determination
Reduce Water Demand		
1. Agricultural Water Use Efficiency	Yes	Already being practiced by major water purveyors in region.
2. Urban Water Use Efficiency	Yes	Already in practice: all urban water purveyors in the CABY region have estimated and are on track to comply with their 2020 targets outlined in their Urban Water Management Plans and required by legislation. Additionally, many CABY DACs have elected to employ practices consistent with the 20x2020 targets even though the fact that they are not technically subject to the legislation.
Improve Operational Efficiency and Transfers		
3. Conveyance – Delta	Yes	During discussions of the Climate TAC, it was decided that activities in the Bay-Delta may be of significant impact to the CABY region. This perspective has been enhanced by the recent release by the State of the BDCP, which shows that North State's reservoirs will reach Dead Pool once every 10 years.
4. Conveyance – Regional/local	Yes	Local water conveyance relies heavily on ditches, canals, and aging infrastructure. Improvements to local infrastructure provide ample opportunities for projects.
5. System Reoperation	Yes	The number of FERC licensed facilities in region will require ongoing consideration of this issue, as will climate change-related, water-adaptive management.
6. Water Transfers	Yes	A key consideration in context of regional drought preparedness plans for coordinated regional response to both short-term and climate change-related supply issues.
Increase Water Supply		
7. Conjunctive Management and Groundwater Storage	Yes	Regional reliance on groundwater for rural residences and options for using conjunctive use as a climate change mitigation are key consideration.
Desalination	Not applicable	Not applicable because of distance from coastal zone.
Precipitation Enhancement	Not applicable	PG&E and Sacramento Municipal Utility District (SMUD) have conducted documented cloud seeding operations within the CABY region. While CABY stakeholders and Plan adoptees may not currently engage in or unilaterally support cloud seeding, such activities may be undertaken in the area.
8. Recycled Municipal Water	Yes	One of the major water purveyors in region already uses this strategy and is considering expansion of facilities, while other purveyors are considering assessing potential benefits of beginning program. Some agencies are evaluating options for out-of-region partners.
Surface Storage – CALFED	Not applicable	There are no CALFED storage plans for this region.
9. Surface Storage – Regional/local	Yes	Various constituencies within the region are in favor of surface storage, while others are not. Ongoing dialogue and feasibility studies will be needed.

Table 10-1 RMS Determination of Regional Relevance with Rational for Determination		
State RMS (DWR 2012 Guidelines) (Applicable RMS are numbered)	Resource Management Strategies Addressed in Plan	Rationale for Determination
Improve Water Quality		
10. Drinking Water Treatment and Distribution	Yes	Evolving water quality standards will keep this strategy relevant, as will ability of regional DACs to meet these standards. Distribution system efficiencies and upgrades are a key concern.
Groundwater Remediation/Aquifer Remediation	Not applicable	The fractured bedrock geology in the region challenges management for substantive aquifer recharge or remediation. There are localized projects (such as meadow restoration, canal lining, and creek restoration) which can yield benefits to groundwater management in the immediate vicinity; regional groundwater is not characterized by large aquifers.
Matching Quality to Use	Not applicable	CABY purveyors have developed infrastructure to allow use of recycled water, have developed substantive integrated projects to support in-stream and ecosystem water quality and removal of legacy mining contaminants, and are addressing water quality in conveyance systems through both lining and education programs.
11. Pollution Prevention	Yes	Contamination from legacy mining, sedimentation from post-fire events, and ongoing monitoring are all issues that are an active focus of CABY members and stakeholders.
Salt and Salinity Management	No	No documented impacts of salt or salinity.
12. Urban Runoff Management	Yes	A variety of CABY members are already actively investigating options and developing pilot projects for locally applicable low-impact design (LID) and green infrastructure to mitigate need for large-scale infrastructure upgrades and repairs.
Improve Flood Management		
13. Flood Risk Management	Yes	Location of wastewater treatment facilities in areas of flood risk/flood plain, as well as canyon-bottom residential areas are key focus.
Practice Resources Stewardship		
14. Agricultural Lands Stewardship	Yes	Both the irrigated agricultural and grazing/pasture operations and lands in the region are key to the local economy and open space values. CABY members are investigating on-farm BMPs, potential for carbon sequestration on pasture lands, and working to identify crops that are appropriate to climate change considerations.
15. Economic incentives (Loans, Grants, and Water Pricing)	Yes	Water-pricing incentives are already in use in the region and will continue to play a role, particularly in response to impacts of supply due to climate change. Local entities could pursue loans and grants to support conservation and stewardship.

Table 10-1 RMS Determination of Regional Relevance with Rational for Determination		
State RMS (DWR 2012 Guidelines) (Applicable RMS are numbered)	Resource Management Strategies Addressed in Plan	Rationale for Determination
16. Ecosystem Restoration	Yes	A wide variety of CABY non-profit organization members have a core mission that focusses on restoration of ecosystems. The major water agencies also have a vested interest in and commitment to stewardship of the watershed environments that enable the region to sustain quality water and sufficient supply.
17. Forest Management	Yes	Much of the region is in federally owned or privately managed forest use. Study of the impacts of a variety of management strategies and pilot projects is already ongoing and will continue. A key evaluation of climate change focused on the impacts of catastrophic wildfire.
18. Recharge Area Protection	Yes	Groundwater recharge attributes of the region are poorly understood. Activities focus on determining the characteristics of local and out-of-region recharge dynamics.
19. Water-Dependent Recreation	Yes	Water-dependent recreation (whether free-flowing or as winter snow) is a primary economic driver for the region. Determining methods to adapt to climate change-related impacts to these resources will be fundamental to the region's economic well-being.
20. Watershed Management	Yes	Stewardship of watershed lands is of primary concern to all CABY stakeholders and members. Issues associated with watershed management are of paramount importance to CABY non-profit organizations that have dozens of projects aimed at this strategy.
Other Strategies		
Crop Idling for Water Transfers	Not applicable	The cropping profile and relatively small magnitude of agricultural activities render this strategy of minimal value to the region.
Irrigated Land Retirement	Not applicable	The cropping profile and relatively small magnitude of agricultural activities render this strategy of minimal value to the region.
21. Land Use Planning and Management	Yes	CABY members and participating agencies already collaborate closely and non-profit entities are investigating options to include LID/green infrastructure in ongoing policy updates to local plans.
Not Addressed by Current State RMS List		
22. Education and Outreach	Yes	This is a key component of all CABY project development and its governance process. This includes use of the CABY web portal to make information available, providing education material in Spanish and provision of materials and pilot projects for local schools.
23. Inter-IRWMP Coordination	Yes	CABY already works with adjacent IRWM regions through the CABY-facilitated Sacramento Region Funding Area Work Group that has already, and will continue to meet annually to discuss options for joint project development, issue identification and resolution, and other options for collaboration.

10.2 Integration of Resource Management Strategies with CABY Governance and Decision-making

CABY began the RMS review process with a systematic evaluation of each RMS to determine its applicability to the CABY region. The evaluation was conducted using a Work Group (WG) established for that purpose and attended by a variety of CABY stakeholders and members. The WG product was then reviewed by the CABY Planning Committee (PC). Other CABY WGs (Water, Issues and Conflicts, Objectives, and the Climate Change Technical Advisory Committee) then utilized this information to inform their deliberations.

The CABY governing body will continue to oversee the integration of RMS into Plan-related activities and ensure that all future Plan updates (especially those for goals/objectives and project development) also include consideration of both updating and continued integration of RMS. Ongoing monitoring of RMS consistency will be required as new projects continue to be identified and existing projects are refined in response to emerging issues, data gleaned from performance measures tracking, and evolving local conditions.

10.3 Integration of RMS into Development of IRWMP Goals and Objectives

The CABY Goals and Objectives Work Group spent considerable time evaluating regionally appropriate RMS as determined by the PC, as shown in Table 10-2. The WG then evaluated all suggested objectives to assure consistency with the RMS. As a result of this effort, each of the 23 RMS identified as relevant to the Plan has at least one corollary objective with the majority meeting at least four and in some cases as many as 16 RMS (See Table 10-4 for a tabulation of the number of RMS addressed by each objective.)

10.4 Integration of Resource Management Strategies with CABY Project Development and Implementation

The CABY group spent considerable time developing projects aimed toward fully implementing the IRWMP objectives and goals, as described above. In turn, The RMS framework was used extensively during the project development activities to ensure a linkage between issues, RMS, goals and objectives, and the development of individual projects.

CABY intentionally provides participants with the opportunity to develop multi-stakeholder, multi-objective projects that utilize multiple RMS. CABY's mercury contamination projects offer a good example of the potential benefits of the integration process. Mercury in sediment affects water supply (through the inability to remove accumulated sediment in area reservoirs, thus lowering storage capacity), and has a considerable effect on the quality of habitat for native species. These water quality issues were identified through the planning and implementation of the CABY Regional Mercury Abatement Initiative. Mercury abatement projects integrate components of multiple water management strategies such as Pollution Prevention, Ecosystem Restoration, Recharge Area Protections, and Education and Outreach.

All of the applicable RMS have at least one CABY Tier 1 project that addresses the strategy (See Table 10-2). In some cases there are over a dozen projects that address an individual RMS. Further, no CABY Tier 1 project addresses fewer than four RMS.

The fact that so many RMS are reflected so frequently in both the CABY objectives and projects is emblematic of the degree to which the strategies were thoroughly integrated into the CABY process. The fact that all Tier 1 projects include and address multiple RMS makes it clear that the synergies and linkages between the various RMS were fully appreciated and understood by the stakeholders, Work Groups, and decision-makers within the region.

Table 10-2	
Number of Projects Addressing Each RMS	
Relevant RMS	Number of CABY Tier 1 Projects Which Address RMS
1. AG Water Use Efficiency	3
2. Urban Water Use Efficiency	3
3. Conveyance – Regional/Local	5
4. System Reoperation	1
5. Water Transfers	0
6. Conjunctive Management & Groundwater Storage	1
7. Recycled Municipal Wastewater	0
8. Surface Storage – Regional/Local	3
9. Drinking Water Treatment and Distribution	6
10. Pollution Prevention	15
11. Salt and Salinity Management	0
12. Urban Runoff Management	8
13. Flood Risk Management	5
14. Agricultural Stewardship	2
15. Economic Incentives	6
16. Ecosystem Restoration	21
17. Forest Management	16
18. Recharge Area Protection	10
19. Water-related Recreation	16
Groundwater ¹	3
20. Watershed Management	25
21. Land Use Planning and Management	3
22. Education & Outreach	20
23. Inter-IRWMP Coordination	19

10.4.1 Overview of Existing or Proposed Activities in the Region Already In Alignment with the RMS

Agricultural Water Use Efficiency:

In the late 1970s and early 1980s, the El Dorado Irrigation District (EID) developed the Irrigation Management System (IMS) to reduce water demand by local farmers. Its immediate success made it a popular strategy within the CABY region and it is now utilized by NID and PCWA, as well. IMS is a program building on California's CIMIS data, soil moisture sensors, and crop water use patterns to help farmers better understand their crops' water needs. In its first decade of use, the IMS system is

¹ Note: While the groundwater characteristics of the region do not support the groundwater RMS, there are three projects which impact very localized groundwater resources so these projects are included in the tally.

estimated to have saved EID over 2,000 acre-feet of water. This system will be important to growers and to water agencies as climate change alters the region's hydrology: 1) it will allow water users to maintain and increase efficiencies; and 2) it will help growers to track plant water to ensure a healthy crop even in times of low precipitation.

Urban Water Use Efficiency:

Both EID and PCWA are active members of the California Urban Water Conservation Council. NID makes use of the State's Demand Management Measures and has a strategy, documented in its AB 1420 tables, for compliance with these practices. All water purveyors in the CABY region have estimated and are on track to comply with their 2020 targets outlined in their Urban Water Management Plans and required by legislation. In addition, many of the DAC water purveyors in the region have voluntarily adopted management measures and operational strategies to attempt to meet these goals, despite the fact that they are not under obligation to demonstrate such activities.

Conveyance – Regional/Local:

For several years the CABY stakeholders have discussed canal lining/piping of aging water conveyance systems. The CABY project portfolio contains several projects aimed at increasing efficiencies in conveyance systems.

As an adjunct to these projects, conversations are ongoing amongst CABY stakeholders to address a particular aspect of canal and ditch management – impacts of canal/ditch lining on human-made wetlands that develop as a result of leaks (i.e., dewatering artificial, water-dependent environments). The repair of these leaks would clearly decrease water waste; however, these artificial wetlands frequently host important biological organisms, mature riparian plant species, and are often enjoyed by walkers, joggers, and cyclists on recreation trails adjacent to the canals. Therefore, conflicts understandably arise in the context of specific project locations and proposed leak repair activities. The pressure to conserve water will likely grow as a result of climate-related changes in the local water supply. These same changes may render the created wetland more biologically and aesthetically important. Continued discussion will be necessary to resolve artificial wetland/conveyance issues.

System Reoperation:

System reoperation means changing *existing* operation and management procedures for *existing* reservoirs and conveyance facilities to reallocate supply to water-related benefits from these facilities. System reoperation may improve the efficiency of existing water uses or it may increase the emphasis of one use over another. Physical modifications to existing facilities may be needed in some cases to expand the reoperation capability. Water management agencies in the region maintain the option for system reoperation within existing regulatory constraints.

Water Transfers:

Water purveyors in the CABY region with water supply which can be deemed to be in surplus of demand on an annual basis can and do export water out of the region through water transfers. This creates revenue for those purveyors, provides additional resources to manage infrastructure, and sustains lower local customer rates. Transfers within the region are not as common although there is increased interest in (and projects proposed for) creation of interties between local agencies to support water transfer in times of emergency (system outages or failures) or drought. It is anticipated the issue of creating capacity to support local water transfers will be discussed in more detail through the preparation of regional drought preparedness plans, as articulated in Water Supply Objective 5. This strategy is likely to only increase in importance as climate change alters regional hydrology.

Conjunctive Management and Groundwater Storage:

There are two possible applications of this RMS:

- There is both surface and groundwater use in the region. Surface water is the primary supply for the region serviced by water agencies and irrigation districts. Many rural residents use individual groundwater wells. However, the individual groundwater resources in the region are unpredictable and often unreliable in terms of both quantity and quality, especially during dry times (and likely in the face of climate change). Water agencies in the CABY region continue to prepare for incidents or extended periods when individual groundwater wells run dry and residents need local water agency assistance.
- Some of the water purveyors in the CABY region, especially those sharing Folsom Reservoir as a common resource, have the option to participate in water banking with the Sacramento Valley. The theory behind CABY region agencies banking groundwater is that excess water would be stored in times of great yield (wet years), and then traded with agencies who could use the groundwater in place of surface water during dry years. The surface water would then be available to the CABY agencies and others through the Folsom Reservoir. While this project is conceptual at this time, it is possible that future pressure on regional resources because of climate change and/or population and development will necessitate this kind of innovation and collaborative resource management. For this reason the idea remains part of the CABY water management portfolio.

Recycled Municipal Wastewater:

El Dorado Irrigation District has successfully made use of recycled wastewater. EID's recycled water service currently represents less than 10 percent of the respective total annual deliveries, but there are plans to study the expansion of this service. EID's expansion of storage would include the development of winter storage, so that the resource is available during the summer season.

As climate change alters regional hydrology, alternate sources of water such as recycled water will become more valuable. Agencies identifying current options for future implementation will be more prepared to deal with these needs.

Surface Storage – Regional/Local:

Surface water storage is a controversial subject throughout the state and the CABY region is no exception. At this time there are two onstream storage facilities being considered within the CABY Plan area – Alder Reservoir by EID and EDCWA and Garden Bar by South Sutter Water District. Alder Reservoir has been adopted as a water supply option by EID but not yet assessed via a feasibility study, while the Garden Bar facility has been the subject of a feasibility study but has been placed 'on hold' while active partners are being sought.

In the recent past, water supply efforts focused on demand management and increasing operational efficiencies. However, with climate change projections including reduced snowpack throughout the Sierra Nevada, storage options are being reconsidered. Another type of storage on a smaller scale within distribution systems, is the use of enclosed storage tanks throughout the region. These tanks can increase the supply flexibility within a service area, assist in managing the challenges, and reduce the expense, of pumping water uphill.

In response to local options for surface water storage being identified and the likely reduction/alteration of area hydrology in response to climate change, the CABY group has discussed surface storage. Some

CABY stakeholders strongly believe that surface water storage of some sort (whether on- or off-stream, or using enclosed storage tanks) is essential to the future security of water supply, not only for the region but for downstream users as well. Other CABY members and stakeholders believe that additional surface water storage should not be considered until all other measures are implemented and the need for the facility (and its cost-benefit) can be conclusively documented.

However, with respect to measures to support sustainable water supply, all CABY stakeholders support consideration of operational and/or demand management changes, increased use of recycled water, increased conservation, and other no-regrets strategies for increasing efficiency of water usage.

The CABY PC has engaged in several discussions about impoundments/reservoirs in general and has engaged in limited and focused discussions about the Alder Reservoir facility feasibility study. It is clear from these discussions that substantive divergence of opinion exists about use of this surface storage strategy. Ongoing discussions will continue to shed light on the nature of the subject and inform the wide-ranging perspectives of the various stakeholders.

Drinking Water Treatment and Distribution:

Any ongoing refinement and promulgation of water quality standards could impact CABY water purveyors directly. For larger districts these ongoing regulatory standards will create a need to upgrade, redesign, and in some cases replace existing treatment facilities. For all water agencies and the smaller DACs in the region, this process can be impacted by the lack of available expertise, staff, and funds to accomplish needed repairs or replacements.

Many of the communities in the region suffer from aging and substandard water distribution infrastructure, experience wide fluctuations in system pressure, considerable water waste through undetected or unrepaired leaks, and are vulnerable to failures of canals and pipes as a result of aging infrastructure or weather-related disruptions. Much of the project proposals within the region are focused on remedying these issues and will continue to focus on this strategy for the foreseeable future.

All of the water purveyors in the region will be vulnerable to changes in water supply relating to climate change. However, less commonly considered aspects of climate change on drinking water treatment and distribution may include impacts on system maintenance and operation, such as increased sedimentation (from increases in catastrophic fire and resulting erosion), fluctuations in peak storm events with associated flow surges and localized flooding, effects of erosion on stability of existing canals, and raw water distribution systems.

Pollution Prevention:

CABY stakeholders have determined that ongoing water quality monitoring is a key priority for inclusion in this strategy. Monitoring allows information to be systematically and reliably shared to enhance organizations' capacity to manage adaptively and track implementation project success. Monitoring can also contribute to early warnings of polluting events or actions. Monitoring-based early warning enables a quick response from the affected agency thus minimizing potential damage to ecosystems or municipal water sources. The ability to monitor and respond to unexpected events will likely prove to be valuable as climate change alters regional hydrology and the effects of contamination events become more difficult to predict. Additional factors relevant to pollution prevention include the following:

- There are legally required water quality monitoring programs in place throughout the CABY region. This monitoring assists water managers and stakeholders in the region to identify when the quality of a particular water body is threatened and aid in the identification of the source.
- The Clean Water Act Section 303(d) has promulgated listings of certain water bodies throughout the CABY region. These areas are listed almost exclusively for water quality, although the Cosumnes is listed for exotic species.
- Legacy mining effects are ubiquitous throughout the CABY region. This contamination, primarily the result of heavy metals, can affect animal and plant species. The metals – usually mercury – accumulate in upper-level trophic species and can affect humans consuming contaminated fish and water plants, as well as entering the area food chain and causing problems for area animals, fish, amphibians, and biota.
- According to the United States EPA, sedimentation is the number-one cause of water pollution in the United States. Erosion and sedimentation are natural processes in mountainous watersheds such as those of the CABY region. However, water contamination can be caused by extraordinary erosion and sedimentation resulting from high intensity wildfire or inadequate or poorly implemented land use management practices. While there are BMP systems in place to manage these variables, sedimentation continues to be a management issue for the CABY region.
- Waste contamination can occur due to the proximity of animal waste areas to waterways, as well as being residential or recreation related. The work of Resource Conservation Districts and counties help control this on private lands, and Forest Service and county processes and permits help control this pollution on public lands. The various Departments of Environmental Health monitor and have regulatory control over private septic systems.

10.4.2 Water Projects that Match Water Quality with Water Use

Many of CABY's water systems are designed to match water quality to the appropriate type of use. For example, in general it is inefficient to use the more expensive treated water for irrigation purposes. Recycled water and untreated (raw) water are better options for irrigation and landscaping.

Matching Water Quality to Agricultural/Landscape Uses

Recycled Water Programs: A number of water purveyors in the CABY region are developing recycled water supplies, which are treated to Title 22 standards. The use of recycled water serves as a source of water that offsets the demand for potable water. For example, EID uses recycled wastewater in the El Dorado Hills and Cameron Park areas for irrigation. This is considered a better match of water quality to the type of water usage.

Matching Water Quality to In-stream and Ecosystem Use

Promoting In-stream Uses: Ambient, in-stream water must be suitable to support a wide range of aquatic habitats and conditions. Water quality for in-stream uses must meet physical, chemical, and biological objectives specific to the habitat and in-stream needs. The seven integrated projects that make up the CABY Mercury Initiative provide a good example of CABY's efforts to improve water quality for in-stream and ecosystem use. The projects are designed to address the region's oldest and longest neglected water quality impacts: mercury and sediment drainage from abandoned mines.

Matching Water Quality to Drinking Water Use

Protect Public Health: To minimize the cost of enhanced treatment, and to provide multiple barriers of protection for public health, it is best that drinking water supplies start with the highest quality source water available. There are several ongoing projects by water purveyors across the region that address this issue.

Urban Runoff Management:

Contaminated urban runoff can be a problem when there is a concentration of development. While this cannot be avoided entirely, it tends to be more of an issue in communities with higher population densities in the CABY region. There is a significant opportunity for technical design innovation, including low impact and green infrastructure designs for urban runoff, because of the rural character of the region and population growth. Both objectives and proposed projects address this issue in the Plan.

Flood Risk Management:

The CABY region does not contain floodplains such as those in the Central Valley, or even in other mountainous regions of the state. Instead, the region is characterized by relatively steep canyons with a sharply confined area subject to inundation, or more gently incised creeks in the lower elevation that again constrain the extent of the area subject to flooding.

Traditional floodplain management is not necessary within the mountainous canyon terrain of the CABY region. However, there are localized flood risks, which could affect water, wastewater, and hydroelectric power generation infrastructure, as well as portions of developed cities and unincorporated areas. Flood management needs to take a different approach in the CABY region, and CABY stakeholders continue to identify affected areas, using FEMA maps, city and county planning documents, and local community knowledge to create the most appropriate management strategies. As with urban runoff management, flood management in the CABY region may present an opportunity to employ green infrastructure and low impact design elements to manage and mitigate flood flows.

Agricultural Lands Stewardship:

As with many of the RMS, there are several ways this strategy can and is being applied within the CABY region. As well as developing objectives and projects to address this issue, CABY has identified the following additional options to use this strategy:

- Comply with the requirements of the Regional Board's Irrigated Land Regulatory Program (ILRP), and implement a program that promotes and rewards good management practices at the individual ranch and farm level
- Work with the National Resources Conservation Service to improve on-farm BMP implementation, such as animal and/or crop rotation
- Research the potential of carbon sequestration in pasture lands, and possibly employ this as a mitigation strategy for other actions
- Identify crops that may be more adapted to an environment altered by climate change: either using less water, being more heat-tolerant and/or fire adapted, or having growth characteristics that are appropriate to emerging climatic conditions

Economic Incentives (Loans, Grants, and Water Pricing):

The use of economic incentives is a common strategy for water purveyors in the CABY region. Both EID and PCWA are in compliance with volumetric pricing requirements by the Bureau of Reclamation and the California Urban Water Conservation Council. NID makes use of the State's Demand Management

Measures, and complies with pricing requirements through those. Research into the potential for loans and grants for project implementation, as well as potential for partnership with NGOs are an important aspect of the CABY work effort. CABY members frequently collaborate to seek public and/or private funding for integrated multi-stakeholder, multi-objective projects.

Ecosystem Restoration:

Source watersheds, such as all four of the CABY region, are critical to the state for a many reasons. Intact watersheds provide a wide variety of quantifiable and qualitative ecosystem services: climate moderation, carbon and nutrient storage, water purification and supply, recreation, habitat, forest products, and genetic reservoirs are a partial list. While the CABY region watersheds are generally intact, there are definite threats (including high intensity forest fire, legacy mining effects, and degraded mountain soils and meadows) that need to be addressed to minimize impacts to the CABY region and to benefit downstream use. This RMS is reflected in both the objectives of the Plan and the projects included for implementation.

Forest Management:

This RMS is particularly applicable to CABY, as management of forest resources to reduce the risk of high intensity forest fire is imperative to sustaining the healthy watersheds upon which the region depends. High intensity fires arguably pose the greatest natural threat to the people and resources of the CABY region and may increase with climate change. CABY members continue to initiate studies, pilot projects and evaluation to determine the most effective way to implement this RMS.

As demands on water supplies for all beneficial uses in California become affected by increasing population, economic and environmental needs, and climate change, optimization of watershed conditions and water management strategies will become ever more critical. CABY stakeholders continue (through establishment of objectives and development of projects) to address forest management on public and private lands across the region.

Recharge Area Protection:

The CABY region is a surface water source area for the Sacramento Valley, as well as for State and federal water projects. In addition, the region provides recharge to both Sierra and valley groundwater sources. This recharge connection has been learned through general research; however, the specifics about where the recharge areas are located or how they function (including transport time) are poorly understood. CABY stakeholders continue (through suggested projects and inter-agency collaboration) to seek a greater understanding of how these underground systems work, and how the CABY region is connected to the groundwater resources throughout the Central Valley.

Water-Dependent Recreation:

Water-dependent recreation activities are a primary economic stimulus in the region. These activities include pursuits such as backcountry use dependent on snowpack, as well as agro tourism and whitewater rafting in summer. These activities could see the effects of climate change before urban areas, due to their dependence on a specific weather pattern. More information on this topic can be found in Chapter 11, Climate Change.

Watershed Management:

Stewardship of the watersheds of the plan area by local agencies, organizations, and entities supports long-term health and productivity for quality, quantity, and timing of water runoff, as well as other ecological and recreational values. Management of watersheds by federal, State, and local agencies and

entities to reduce the risk of high intensity forest fire is critical to sustaining healthy watersheds. High intensity fires have and, without adequate management, can denude forest soils, reducing hydraulic conductivity, thus increasing erosion and sedimentation and removing the medium for tree growth. The potential for high intensity wildfire may increase with climate change and, therefore, watershed stewardship has risen in regional importance. The CABY region also is served by NGOs that have a wide-ranging focus on watershed and/or resource management including: mountain meadow/wetland/fen restoration and enhancement, water quality monitoring, citizen education and stewardship, scientific monitoring and evaluation, riparian and fish, groundwater, forest health and maintenance, endangered species, and other similar issues. Both public agencies and NGOs will be critical partners in this RMS.

Land Use Planning and Management:

In CABY's 2007 IRWMP document, land use was listed as an issue of conflict and, as such, one that would not be brought to the group for active discussion – largely to preserve the emerging stakeholder group's capacity to develop trust and an effective working, collaborative environment. However, by the publication of 2009 Water Plan RMS and the updated 2012 DWR Guidelines, the nexus between water management and land use decision-making was noted by many stakeholders as important to the region. As a result, the Plan Update includes a substantive outreach strategy aimed at identifying the nexus between land use and water management and also identification of existing policies and procedures to support increased collaboration. CABY's efforts in this IRWMP Update have demonstrated stakeholders' interest in and capacity for effective and productive discussions (more detail on this topic can be found in Chapter 8, Water and Land Use). Plans for implementing the outcomes of the evaluation (characterized by substantive interviews with local water agencies and their corresponding land use decision-makers) are part of the CABY's RMS for integrating land use and water management.

Additionally, several CABY objectives will guide actions in the next several years and, as CABY tracks organizational performance, it may be changed, emphasized, or otherwise altered to best respond to current needs.

10.4.3 RMS not Included in DWR Update 2009 but Identified by CABY Stakeholders

Education and Outreach:

This strategy focuses on two separate components: 1) integration of resource education into the design of all CABY implementation projects, and 2) education and outreach to the general public.

It is important that the general public understand the value of regional, integrated, watershed-level management. Therefore, ongoing outreach to the public will continue and be augmented by using the same methods described for stakeholder recruitment. Additionally, an important initiative established in 2012 is aimed at increasing outreach to Latino community members – by meeting directly with organizations and entities (with an emphasis on Latino health and community organizations), and also through publication and distribution of educational materials in Spanish.

Agencies, organizations, and entities currently participating in the PC are engaged. However, representatives (whether newly elected or appointed board members, paid staff and/or volunteers) from those organizations will undoubtedly change with time. Therefore, ensuring that new representatives of established member entities are fully oriented will be important to ensuring continuity of participation and collaborative activities.

In recognition of the importance of project and issue-related education, CABY developed a Plan objective specifically focused on education and outreach as a component of each CABY project and program. It is part of CABY's "overarching objectives" (see Chapter 9 for more information): *OV-1: Integrate outreach and education into all CABY projects and programs.*

Inter-IRWMP Coordination:

CABY values the opportunity to collaborate and engage in project and issue-specific conversations with adjacent IRWM regions, and has been a long-term organizer of meetings with all IRWM entities within the Sacramento Region Funding Area (SFRA).

Issues such as mercury and heavy metal contamination, climate change-related impacts to water supply timing and availability, migration corridor connectivity, removal of barriers to anadromous fish spawning, forest land management, and other similar topics do not stop at county or IRWM regional lines. In recognition of this, the CABY region remains committed to ongoing outreach to neighboring IRWMs and IRWMs within the SFRA aimed at fostering conversations, collaboration, project development for projects of mutual benefit, and ongoing coordination of large-landscape strategies and programs.

One example of implementing this RMS is the mercury projects submitted by CABY members for Plan inclusion in 2012. Mercury contamination is an interregional issue: the CABY region is a source area, and mercury transported by way of river and stream corridors through the Central Valley and into the Bay-Delta. The submitted and fully integrated project addressed this by including outreach and coordination with affected IRWMs as part of the project description and implementation plan.

10.5 Integration Between Data Management Activities and RMS Updates

CABY has already established a Data Management System that ensures that all CABY members and the general public have access to the technical data which supports the Plan and its RMS (see Chapter 15, Technical Analysis). Additionally, there are Plan procedures proposed to ensure that the RMS chapter will be revisited and revised as necessary in response to the availability of new or updated technical data and emerging issues. The RMS chapter will be subjected to this review and will be updated as required. The RMS review will include four components: 1) review of RMS that were previously deemed "not applicable" to ensure that changing conditions are reflected in the ongoing integration of management strategies; 2) review of updates to RMS in the California Water Plan (beginning with Water Plan 2013 when it is finalized) to ensure that any newly identified RMS are included in the Plan; 3) reviews of both Plan and project performance to determine if individual RMS need to be reconsidered and/or how objectives and strategies may be impacted by new information and 'lessons learned' from project implementation; and 4) impacts to chapter content resulting from the emergence of new data, findings, and issues.

Table 10-3 CABY Objectives and RMS Addressed – An Overview		
Objective	Applicable RMS	
Programmatic Area: Water Supply		
GOAL: Ensure adequate and reliable supply that can be adapted to climate change and meet the needs of the region.		
Primary Issue: Conservation	<ul style="list-style-type: none">Agricultural Water Use EfficiencyUrban Water Use EfficiencyConveyance – Regional/Local	<ul style="list-style-type: none">Economic IncentivesUrban Run-off ManagementEducation and Outreach
Primary Issue: Infrastructure		
Aging Infrastructure	<ul style="list-style-type: none">Agricultural Water Use EfficiencyUrban Water Use EfficiencyConveyance – Regional/Local	<ul style="list-style-type: none">Drinking Water Treatment and DistributionPollution Prevention
Interties	<ul style="list-style-type: none">Conveyance – Regional/LocalSystem ReoperationWater Transfers	<ul style="list-style-type: none">Drinking Water Treatment and Distribution
Primary Issue: Water Storage	<ul style="list-style-type: none">Recycled WaterSurface Storage – Regional/LocalDrinking Water Treatment and Distribution	<ul style="list-style-type: none">Water-Dependent RecreationEducation and OutreachIRWMP Coordination
Primary Issue: Water Management Operations		
Drought	<ul style="list-style-type: none">Agricultural Water Use EfficiencyUrban Water Use EfficiencySystem ReoperationAgricultural StewardshipEconomic Incentives	<ul style="list-style-type: none">Recycled WaterEducation and OutreachIRWMP Coordination
Recycled Water	<ul style="list-style-type: none">Economic IncentivesRecycled Municipal WaterSurface Storage – Regional/Local	<ul style="list-style-type: none">Matching Quality to UseEducation and Outreach
Primary Issue: Water Transfers	<ul style="list-style-type: none">Local ConveyanceWater Transfers	<ul style="list-style-type: none">Conjunctive ManagementEducation and Outreach
Primary Issue: Groundwater	<ul style="list-style-type: none">Conjunctive Management and Groundwater StorageGroundwater RemediationLand-use Planning and Management	<ul style="list-style-type: none">Education and Outreach

Objective	Applicable RMS	
Programmatic Area: Water Quality		
GOAL: Ensure sufficient water quality to support healthy ecosystems and dependent organisms.		
Primary Issue: Contamination		
Legacy Mining Toxins	<ul style="list-style-type: none">▪ Pollution Prevention▪ Ecosystem Restoration▪ Recharge Area Protection▪ Water-Dependent Recreation	<ul style="list-style-type: none">▪ Watershed Restoration▪ Drinking Water▪ Education and Outreach▪ IRWMP Coordination
Urban Run-off and Abandoned Mine Land Run-off	<ul style="list-style-type: none">▪ Pollution Prevention▪ Ecosystem Restoration▪ Forest Management▪ Urban Run-off Management▪ Water-Dependent Recreation	<ul style="list-style-type: none">▪ Watershed Management▪ Drinking Water▪ Education and Outreach▪ IRWMP Coordination
Primary Issue: Sedimentation Management	<ul style="list-style-type: none">▪ Pollution Prevention▪ Urban Runoff Management▪ Ecological Restoration▪ Forest Management	<ul style="list-style-type: none">▪ Land-use Planning and Management▪ Water-Dependent Recreation▪ Watershed Restoration▪ Education and Outreach
Primary Issue: Wastewater Management	<ul style="list-style-type: none">▪ Pollution Prevention▪ Flood Risk Management	
Primary Issue: Headwaters Protection	<ul style="list-style-type: none">▪ Ecosystem Restoration▪ Forest Management▪ Recharge Area Protection▪ Water-Dependent Recreation▪ Ecosystem Restoration▪ Flood Risk Management	<ul style="list-style-type: none">▪ Drinking Water▪ Pollution Prevention▪ Economic incentives (Loans, Grants, and Water Pricing)▪ Education and Outreach▪ IRWMP Coordination
Primary Issue: Temperature	<ul style="list-style-type: none">▪ Ecosystem Restoration▪ Forest Management▪ Recharge Area Protection	<ul style="list-style-type: none">▪ Watershed Restoration▪ Groundwater Remediation
Programmatic Area: Environment and Habitat		
GOAL: Preserve and restore watershed health.		
Primary Issue: Fish Passage	<ul style="list-style-type: none">▪ Ecosystem Restoration▪ Watershed Management	
Primary Issue: Aquatic Biota	<ul style="list-style-type: none">▪ Ecosystem Restoration▪ Watershed Restoration▪ Water-Dependent Recreation	<ul style="list-style-type: none">▪ Education and Outreach▪ IRWMP Coordination
Primary Issue: Instream Flow	<ul style="list-style-type: none">▪ Ecosystem Restoration	<ul style="list-style-type: none">▪ Watershed Restoration

Objective	Applicable RMS	
	<ul style="list-style-type: none"> Forest Management Recharge Area Protection Water-Dependent Recreation 	<ul style="list-style-type: none"> Economic incentives Education and Outreach IRWMP Coordination
Primary Issue: Meadows	<ul style="list-style-type: none"> Ecosystem Restoration Forest Management Recharge Area Protection Economic Incentives 	<ul style="list-style-type: none"> Drinking Water Education and Outreach IRWMP Coordination
Primary Issue: Fire and Fuels	<ul style="list-style-type: none"> Ecosystem Restoration Forest Management Recharge Area Protection 	<ul style="list-style-type: none"> Watershed Management Education and Outreach
Primary Issue: Invasive Species		
Aquatic Invasive Species	<ul style="list-style-type: none"> Ecosystem Restoration Water-Dependent Recreation Education and Outreach IRWMP Coordination 	
Terrestrial Invasive Species	<ul style="list-style-type: none"> Ecosystem Restoration Forest Management Watershed Management Education and Outreach 	
Programmatic Area: Climate Change		
<i>GOAL: Anticipate climate change needs and be prepared to respond adaptively to human and ecosystem needs.</i>		
Climate Change	<ul style="list-style-type: none"> Agricultural Water-use Efficiency Urban Water-use Efficiency System Reoperation Water Transfers Flood Risk Management Agricultural Stewardship Conjunctive Management Recycled Water Surface Storage – Regional/Local Ecosystem Restoration 	<ul style="list-style-type: none"> Forest Management Recharge Area Protection Watershed Management Economic incentives (Loans, Grants, and Water Pricing) Land use Planning and Management Urban Run-off Management Water-Dependent Recreation Education and Outreach IRWMP Coordination
Programmatic Area: Human-Landscape Interaction		
<i>GOAL: Maintain and enhance functioning landscapes that provide sustainable services for humans.</i>		
Primary Issue: Habitat Alteration	<ul style="list-style-type: none"> Agricultural Stewardship Economic Incentives Ecosystem Restoration 	<ul style="list-style-type: none"> Land use Planning and Management Pollution Prevention Water-Dependent Recreation

Objective	Applicable RMS	
	<ul style="list-style-type: none"> Forest Management Recharge Area Protection 	<ul style="list-style-type: none"> Watershed Management Education and Outreach
Primary Issue: Native American Uses	<ul style="list-style-type: none"> Education and Outreach Flood Risk Management Economic Incentives Ecosystem Restoration Land use Planning and Management 	<ul style="list-style-type: none"> Urban Run-off Management Watershed Management Education and Outreach IRWMP Coordination
Primary Issue: Flooding		
Primary Issue: Open Space	<ul style="list-style-type: none"> Agricultural Stewardship Economic Incentives Ecosystem Restoration Forest Management Recharge Area Protection 	<ul style="list-style-type: none"> Land use Planning and Management Pollution Prevention Water-Dependent Restoration Education and Outreach
Primary Issue: Disadvantaged Communities	<ul style="list-style-type: none"> Economic Incentives IRWMP Coordination 	
Primary Issue: Recreation	<ul style="list-style-type: none"> Economic Incentives Water-Dependent Recreation 	
Primary Issue: Hydropower	<ul style="list-style-type: none"> Local Conveyance Economic Incentives Education and Outreach 	
Primary Issue: Agriculture	<ul style="list-style-type: none"> Agricultural Stewardship Economic Incentives Ecosystem Restoration Forest Management Recharge Area Protection 	<ul style="list-style-type: none"> Land use Planning and Management Pollution Prevention Water-Dependent Recreation Watershed Management Education and Outreach
Primary Issue: Sustainable Economy/Self-sufficient Communities	<ul style="list-style-type: none"> Economic Incentives 	
Primary Issue: Governance		
Political	<ul style="list-style-type: none"> Education and Outreach IRWMP Coordination 	
Legislative	<ul style="list-style-type: none"> Education and Outreach IRWMP Coordination 	
Regulatory	<ul style="list-style-type: none"> Education and Outreach IRWMP Coordination 	

Overarching Objectives:		
Overarching objectives are topics that have been raised with every discussion of specific issue-based objectives. These components of the CABY planning process will be considered for every program implemented and for inclusion in each project concept.		
Education and Outreach	<ul style="list-style-type: none">▪ Education and Outreach	
Financial Feasibility	<ul style="list-style-type: none">▪ <i>No objective developed – will be included in the finance chapter</i>	
Data Analysis and Monitoring	<ul style="list-style-type: none">▪ Education and Outreach	
Regional Planning and Land use	<ul style="list-style-type: none">▪ Land use Planning and Management▪ Education and Outreach▪ IRWMP Coordination	

Table 10-4: Numerical Tabulation of Number of Objectives Meeting Each Applicable RMS

CABY Objectives	State RMS																					CABY RMS		
	AG WUE	Urban WUE	Local Conveyance	System Reoperation	Transfers	Flood Risk	Agricultural Stewardship	Economic Incentives	Ecological Restoration	Forest Management	Recharge Area Prot.	Conjunctive Management	Recycled Water	Surface Storage - local	Drinking Water	Groundwater	Land Use	Quality to Use	Pollution Prevention	Urban Runoff Management	Recreation	Watershed Restoration	Education & Outreach	IRWMP Coordination
WS-1	X	X	X					X												X			X	
WS-2			X												X				X					
WS-3			X	X	X										X									
WS-4													X	X	X						X		X	X
WS-5	X	X		X			X	X					X										X	X
WS-6								X					X	X				X					X	
WS-7			X		X							X												X
WS-8												X				X	X						X	
WS-9												X				X	X						X	
WQ-1									X		X				X				X		X	X	X	
WQ-2									X		X				X				X		X	X	X	
WQ-3									X	X					X				X	X	X	X	X	X
WQ-4									X	X							X		X	X	X	X	X	
WQ-5						X													X					
WQ-6										X	X				X						X	X	X	X
WQ-7									X	X	X								X		X	X	X	X
WQ-8								X											X					
WQ-9									X	X	X					X						X		
EH-1									X												X	X	X	X
EH-2									X													X	X	X
EH-3									X															
EH-4								X	X	X	X					X						X	X	X
EH-5										X												X		
EH-6									X												X		X	
EH-7									X												X		X	

Table 10-4: Numerical Tabulation of Number of Objectives Meeting Each Applicable RMS, *continued*

CABY Objectives	State RMS																						CABY RMS	
	AG WUE	Urban WUE	Local Conveyance	System Reoperation	Transfers	Flood Risk	Agricultural Stewardship	Economic Incentives	Ecological Restoration	Forest Management	Recharge Area Prot.	Conjunctive Management	Recycled Water	Surface Storage - local	Drinking Water	Groundwater	Land Use	Quality to Use	Pollution Prevention	Urban Runoff Management	Recreation	Watershed Restoration	Education & Outreach	IRWMP
CC-1	X	X		X	X	X	X	X	X	X	X	X	X	X			X			X	X	X	X	X
CC-2				X				X					X										X	
HL-1							X	X	X	X	X						X		X		X	X	X	
HL - 2																							X	X
HL-3						X		X																
HL-4							X	X	X	X	X						X		X		X	X	X	
HL-5								X																X
HL-6								X													X			
HL-7			X					X															X	
HL-8							X	X	X	X	X						X		X		X	X	X	
HL-9							X	X	X	X	X						X		X		X	X	X	
HL-10								X																
HL-11																							X	X
HL-13																							X	X
HL-14																							X	X
OV-1																							X	
OV-2																							X	X
OV-3																	X							
Total times objectives touch on RMS:	3	3	5	4	3	3	7	16	17	12	11	4	4	3	7	4	9	1	12	4	16	16	31	16

Table 10-5: Resource Management Strategies Addressed by Tier 1 Projects - Review Factor B

CABY Tier 1 Projects	State RMS																					CABY RMS			
	AG WUE	Urban WUE	Local Conveyance	System Reoperation	Transfers	Flood Risk	Agricultural Stewardship	Economic Incentives	Ecosystem Restoration	Forest Management	Recharge Area Prot.	Conjunctive Management	Recycled Water	Surface Storage - local	Drinking Water	Groundwater	Land Use	Quality to Use	Pollution Prevention	Urban Runoff Management	Recreation	Watershed Management	Education & Outreach	IRWMP Coordination	Number of RMS addressed by each project
1		X	X						X						X					X		X			6
2			X									X			X									X	4
3	X	X	X			X									X	X							X	X	8
4		X	X												X				X					X	5
5									X	X									X		X	X	X		6
6									X										X		X	X	X		5
7									X	X									X	X	X	X			6
8						X			X					X	X				X	X		X			7
9						X			X	X	X			X	X				X	X	X	X	X	X	12
10									X	X	X								X		X	X	X		7
11								X	X	X	X								X	X	X	X			8
12								X		X												X	X	X	5
13										X												X	X	X	4
14						X			X	X	X			X		X			X		X	X	X	X	11
15									X												X	X	X	X	5
16				X					X												X	X		X	5
17									X	X	X								X			X	X		6
18									X	X											X	X	X	X	6
19									X	X	X										X	X	X	X	7
20										X											X	X	X		4
21									X	X	X										X	X	X	X	7
22									X	X	X											X	X	X	6

CABY Tier 1 Projects	State RMS																					CABY RMS			
	AG WUE	Urban WUE	Local Conveyance	System Reoperation	Transfers	Flood Risk	Agricultural Stewardship	Economic Incentives	Ecosystem Restoration	Forest Management	Recharge Area Prot.	Conjunctive Management	Recycled Water	Surface Storage - local	Drinking Water	Groundwater	Land Use	Quality to Use	Pollution Prevention	Urban Runoff Management	Recreation	Watershed Management	Education & Outreach	IRWMP Coordination	Number of RMS addressed by each project
23								X	X	X	X								X	X	X	X	X	X	10
24									X												X	X	X	X	5
25			X					X														X		X	4
26						X			X	X	X					X	X		X	X	X	X	X	X	12
27	X						X	X	X								X		X	X		X	X	X	10
28	X						X	X	X								X		X	X		X	X	X	10
Times projects address RMS	3	3	5	1	0	5	2	6	21	16	10	1	0	3	6	3	3	0	15	8	16	25	20	19	